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ELECTRIC MOTOR UNIT, IN PARTICULAR FOR A MOTOR VEHICLE,  
INCORPORATING CONTROL ELECTRONICS

5 This invention involves an electric motor unit and an electronics for control of the motor.

The electric motor unit proposed by the invention can be advantageously used in a motorized fan used for the heater and/or vent and/or air conditioner of a motor vehicle.

10 Historically, the stator of such a motor unit is made up of a carbon carrying plate (PPC) which presents, first, a brass insert and, second, a radiator.

The brass insert serves to, first, guide the carbons and, second, to bring the current closer to the MOSFET transistor lead from the power circuit to the right of the radiator.

15 The radiator, generally made of aluminum, recools the power components (diodes, MOSFET transistors) and presents casings into which certain electronic components carried by a circuit imprinted with the command electronics are received and held.

A motor unit of this type was described in the French patent application of the plaintiff disposed under the number 98 03128.

20 A goal of the invention is, particularly, to propose a motor unit structure that allows very high tolerances of connections between the radiator and the brass insert.

Another goal of the invention is to propose a motor unit structure, the rigidity and the watertightness of which is improved.

25 Still another goal of the invention is to propose a motor unit structure in which the means of connection and the assembly of the components are simplified.

The invention proposes an electric motor unit of a motor vehicle containing a wiper blade carrier plate that presents, first, a brass insert and second, a radiator, characterized by the plate presenting a plastic over-molding that surrounds the insert and the radiator.

30 This over-molding allows it to make up for the play between the pieces.

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In addition, it contributes to the rigidity of the plate, which allows optimization of the conception of the radiator and the quantity of aluminum used for it, by removing from the radiator the parts that are not necessary in its recooling and that only serve to increase the rigidity of the .

5 Moreover, the over-molding also presents a partition that separates, in a waterproof way, on the plate, the zone designed to receive the electronic card and a wiper blade.

10 The area that is defined for the over-molding and which receives the card can, in addition, be closed by a lid for which the edge of the over-molding defines a watertight plane.

The combination of the over-molding and the lid is defined by the imprinted circuit card and the electronic components (in the cold area of the motor) a watertight case in which they are thermically isolated in relation to the zone that carries the brushes (electrotechnical zone - hot zone).

15 There is also an uncoupling between the electronic zone and the electrotechnical zone.

It can also, advantageously, be planned that on the separation partition the means of respiration allowing circulation of the air from one zone to the other without allowing the entrance of moisture in the electronic zone.

20 Other characteristics and advantages of the invention will become more clear in the following description. This description is purely illustrative and not limiting. It must be read in regards to the attached drawings on which:

- figure 1 is a cut view schematic representation of the motor unit conforming to one possible method of production of the invention;
- 25 - figure 2 is an exploded perspective view of a motor unit from figure 1;
- figure 3 is a perspective schematic representation illustrating the connection of the plate to the casing of the motor unit of figures 1 and 2;
- figure 4 is a detailed perspective representation of the mechanical means for the blockage of the plate in relation to the casing.

The motor unit which is illustrated in figures 1 and 2 contains a casing 1, a rotational axis 2, an inductor fixed in relation to the casing, and an inductor 4 powered by the brushes or carbons 5.

5 These brushes or carbons 5 are guided by a brass insert 6 which presents an electronic wiper blade carrier plate (PPCE) that also contains a radiator 7.

On this radiator 7 are placed power components (diodes, MOSFET transistors).

A printed circuit card C1, which carries control components, is also placed to the right of this radiator 7.

10 The PPCE plate presents a over-molding 9 which surrounds the brass insert and the radiator.

This over-molding 9 also presents a partition 10 that separates, in a watertight manner, on the plate, the zone that is designed to receive an electronic card C1, from the electrotechnical zone that carries the brushes.

15 The peripheral over-molding and this partition 10 define, with a lid 12, a watertight case into which is received the electronic card C1.

The peripheral over-molding and the transversal partition 10 together define a watertight plane on which is received a joint 13 that is designed to be compressed between the lid 12 and the edge of the over-molding 9.

20 This lid 12 is made up of a plastic hood 12a in which is placed a metallic-plated hood 12b.

This printed circuit card C1 is double-sided, the components reaching from one side of the card to the other.

25 It is foreseen that the over-molding 9 casings allow the positioning and holding of the components before soldering them onto the card.

The power and control current is led to the electronic components (control components of the printed circuit card and power components (MOSFET, diodes) mounted on the radiator 7) by the stripe that presents the brass insert 6.

30 The brass insert is directly soldered to the printed circuit card or to the power components. One removes, as a consequence, a connection level between the printed circuit card C1 and the brass insert. The links between the insert and the card C1 are

thus optimized, which allows the considerable reduction of heating of the surface of the electronic card.

The power components like the MOSFET transistor and the diodes are cooled by the aluminum radiator 7, which is fitted with blades placed in the external air flux.

5 The radiator, the plastic over-molding, and the lid are assembled in such a manner to make up a watertight case vis-à-vis the exterior, but also from the interior of the motor (thermal protection, protection from dust, protection from electromagnetic rays, etc.)

10 The means allowing the removal of condensation produced by the radiator 7 in the case defined by the over-molding 9 and the lid 12 are advantageously foreseen for in the watertight partition 10.

Also, the over-molding 9 presents the means for the passage of the wires designed to power the brass insert (cut 17). Particularly, the over-molding contains means allowing the implantation of a connecting module designed to power the insert and the electronic controls and allows the connection towards the exterior by a complimentary connector.

The electrotechnical part is closed by a flask F.

As one can see in figures 2 to 4, the over-molding 9 of the plate presents elastic attachment flaps 14 designed to work with complimentary forms 15 can come from the stamping that presents the case 1, in order to stabilize the plate in relation to the case 1.

One will note that one solution for attachment is particularly economical; habitually, the means of attaching the plate on the case are made up of rolled-stapled sheet metal.

25 The elastic leads 14 and the complimentary forms 15 that present the case are, for example, restarted in such a way to create a limitation imposing a single possible position relative between the plate and the case.

For example, the leads 14 and the forms 15 are angularly spaced respectively two by two at 115°, 115°, 130°.

30 As is illustrated on figure 4, the elastic leads 14 end, for example, by beveled protuberances 16 that facilitate the connection of the plate onto the case and assure,

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during of the connection, the mechanical stabilization of the ensemble by avoiding the lowering of the plate under the counterweight of the electronics incorporated into the motor.

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